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REPORT OF THE SECOND NORWEGIAN EXPEDITION IN THE "FRAM" 1898-1902.

No. 11. Bryophyta by N. Bryhn, Kristiania, 1907.

PER AXEL RYDBERG, PH. D.

The expedition was under the command of Capt Otto Sverdrup, a well-known polar explorer, and the botanist of the same was Dr. Herman G. Simons. With a very few exceptions all the mosses were collected by the latter. The collection was very large, filling eight big boxes and numbering towards 1700 numbers of mosses alone. The report is published by the Society of Arts and Sciences of Kristiania, Norway, at the expense of The Fridtjof Nansen Fund for the Advancement of Science. It is printed in large octavo, on good paper and with large clear type. It contains 260 pages.

Dr. Bryhn states in his preface that the material was not easy to work up. In arctic regions the forms become much changed. The dry climate produces a diminution of the surface. The arctic mosses also have a tendency to produce threadlike innovations and all the leaves are usually short. Most of the species are found in diminutive forms which give the impression of starved dwarfs. Something rather extraordinary is the high coloration of the cell membranes of the leaves, which are yellow, red, brown or crimson, apparently so as to give protection against the strong light day and night during the short period of growth. Very few species produce fruit, in general only the acrocarpous mosses, especially the bisexual species of the genus *Bryum*. The fruits that had been perfected had often been damaged or altogether torn off. The snow-sparrow, *Emberiza nivalis*, is probably to blame for this, as according to Prof. Berggren, its food to a great extent consists of the fruits of mosses. Very few of the arctic mosses are found in mass or in pure growth. Usually they appear in mixed tussocks, some of these containing even twenty to thirty different species. It often happened that different species growing in the same tussock had taken upon themselves the same habit so that all resembled each other, and it was only under the microscope that it was possible to distinguish them.

In working up the collection Dr. Bryhn had two specialists as collaborators, viz. Mr. B. Kaalaas, in the Hepatics, and the late Mr. E. Ryan in the genus *Bryum*. The new species in these groups were published under joint authorship with these gentlemen. At the end of the preface is given a list of the most important literature used in working up the collection.

The report proper is divided into three parts: First, an account of the different places visited and where collections were made, and lists of species gathered at each place. Second, a systematic annotated catalogue of the whole collection, including notes on distribution, habitat, etc., and

descriptions of thirty-five new species and nineteen new varieties. Third, a list of all the species that had been found in each number of the exsiccata. In No. 533, for instance, he had found twenty-nine, in No. 546, twenty-five species and varieties, and in 951 not less than thirty-two species. At the end of the report are two plates illustrating the leaves of the following species: *Gymnostomum laevi* Bryhn, *Fissidens arcticus* Bryhn, *Polytrichum fragile* Bryhn, *Orthothecium acuminatum* Bryhn, *Brachythecium salebrosum* var. *binervium* Bryhn, *Hypnum tundrae* (Arn.) Joerg, and *Hypnum hyperboreum* Bryhn.

The first place that was touched by the expedition was Egedesminde or Godhavn, Greenland, at about lat. 69 deg. During the short stay about forty species of bryophytes were gathered. Most of these were common and well known arctic species. The following were, however, of special interest: *Lophozia Baueriana*, new to the western hemisphere; *Cynodontium strumiferum*, new to arctic America, and *Hypnum pseudorufescens*, before known only from two or three places in Europe.

The second place where bryophytes were collected was at Foulkefjord in Northwest Greenland, at lat. 78 deg. 20 min. Here were collected for the first time the following new species: *Lophozia harpanthoides*, *Plagiochila arctica*, *Fissidens arcticus* and *Polytrichum fragile*. A list of eighty-six species collected there is given.

Next in turn came Ellesmere Land, where the expedition passed the first winter. From Framshavn, the place of wintering, as a center several excursions were made during the fall of 1898 and the summer of 1899, to the coasts of this land and the neighboring islands at lat. 78 deg. 40 min.-79 deg. Here were discovered the following new species: *Diplophyllum incurvum*, *Gymnostomum laeve*, *Lophozia violascens*, *Bryum gemmaceum*, *B. subfoveolatum*, *B. cyclophyloides*, *B. pertenellum*, *Orthothecium acuminatum* and *Hypnum hyperboreum*. Of these the first two were rather common and the following very scarce. In all two hundred and eleven species were collected.

From Smith's Sound the course was directed towards Jones' Sound, where North Lincoln was touched. A stay was made at Framjord, situated at lat. 70 deg. 20 min. Eighty-three species were collected, of which none were new. The journey was continued in the fall of 1899 along Jones Sound. King Oscar's Land was discovered. The expedition was forced to winter here three times. Many excursions were made and each of the many fjords was more or less satisfactorily investigated. Not less than two hundred and thirty-three species of bryophytes were collected and not less than seventeen new species discovered. These were: *Scapania Simmondsii*, *Funaria polaris*, and the following species of *Bryum*: *hyperboreum*, *laxirete*, *liliputanum*, *parvum*, *brachythecium*, *cancelliforme*, *corioideum*, *angustidens*, *semiovatum*, *Simmondsii*, *glomeratum*, *nodosum*, *densum*, *penduliforme*, and *teretinerve*.

From King Oscar's Land were made botanical excursions to the Islands of North Devon and North Kent. On the former, situated at about lat. 76 deg. and on small neighboring islands, Castle Island and Devil's Island, sixty-four species were collected, of which the very curious *Bryum paganum*

was new. To North Kent, situated outside King Oscar's Land at about lat. 76 deg. 50 min. was made only one excursion, on which fifty-one species were collected, all on the high table-land three hundred to three hundred and fifty meters above the sea level.

During the whole expedition were collected about two hundred and ninety species. Besides the new species mentioned above, there is also given the description of *Lophozia Murmanica* which was known before but had remained undescribed, and three varieties were raised to specific rank under the names of *Marsupella arctica*, *Cephalozia verrucosa* and *Cinclidium polare*. In all thirty-five new species and twenty-two new varieties were added to science and nineteen new to the Western Hemisphere. Something surprising was the finding of several species which hitherto had been regarded as more southern plants, as *Lophozia marchica*, *Cephalozia biloba*, *Cynodontium gracilescens*, *Fissidens exiguus*, *Aloina rigida*, *Tayloria acuminata*, *Heterocladium Macounii* and *Hypnum pseudorufescens*.

The following species are also new to the western hemisphere: *Lophozia murmanica*, *Cephalozia biloba*, *Diplophyllum gymnostomopilum*, *Lophozia Baueriana*, *Racomitrium brevisetum*, *Bryum autumnale*, *B. opdalense*, *B. curvatum*, *B. subtumidum*, *B. salinum*, *B. stenodon*, *B. lapponicum*, *B. Graefianum*, *B. campylocarpum*, *B. Fridtzii*, *B. confluens*, *Aulacomnium acuminatum*, *Hypnum latinerue* and *H. pseudorufescens*.

The new species and varieties described in the report and those supposed to be new to the continent, seventy-six in all, were collected at the following stations:

HEPATICAÆ.

MARSUPELLA ARCTICA (Berggr.) Bryhn & Kaalaas sp. n.

Sarcoscyphus emarginatus (Ehrh.) Hartm. v. *arcticus* Berggr. Ellesmere Land; Cape Rutherford and Cape Viole. King Oscar's Land; Gaasefjord.

APLOZIA ATROVIRENS GRACILIS Bryhn & Kaalaas var. nov.

King Oscar's Land; Gaasefjord and Landsend. Ellesmere Land; Beitstadfjord, at lat. 79 deg.

LOPHOZIA HARPANTHOIDES Bryhn & Kaalaas sp. nov.

North Lincoln; Framfjord, King Oscar's Land; Havnefjord, Gaasefjord, Reindeer Bay, Excrement Bay and Land's End. North Kent. Northwest Greenland; Foulkefjord. Ellesmere Land; Framshavn, Glacial Valley, Lastrea Valley, Bedford Pim Island, Skraelling Island and Cape Rutherford, lat. 78 deg. 50 min.

LOPHOZIA MURMANICA Kaalaas sp. nov.

King Oscar's Land; Gaasefjord. Ellesmere Land; Cape Rutherford, lat. 78 deg. 50 min. (Type from Litsa, Murmanic, Lappland.)

LOPHOZIA VIOLASCENS Bryhn & Kaalaas sp. nov.

King Oscar's Land; Havnefjord. Ellesmere Land; Bedford Pim Island.

LOPHOZIA BAUERIANA Schiffner.

West Greenland; Egedesminde, North Lincoln; Framfjord. Ellesmere Land; Framshavn, and Glacier Valley. (Type from Sarjek, Swedish Lappland).

LOPHOZIA QUADRILOBA HETEROPHYLLA Bryhn & Kaalaas var. nov.

North Lincoln; Framfjord, King Oscar's Land; Havnefjord, Reindeer Bay, Gaasefjord and Land's End. North Kent; Ellesmere Land; Framshavn, Cape Rutherford, Lastraea Valley, Bedford Pim Island.

PLAGIOCHILA ARCTICA Bryhn & Kaalaas sp. nov.

North Lincoln; Framfjord, King Oscar's Land; Havnefjord, Gaasefjord and Reindeer Bay. North Kent; Northwest Greenland; Foulkefjord. Ellesmere Land; Cape Rutherford and Beitstadfjord, lat. 70 deg.

CEPHALOZIA BICUSPIDATA ARCTICA Bryhn & Kaalaas var. nov.

Ellesmere Land; Bedford Pim Island, Glacial Valley, Cape Viole, Cape Rutherford and Beitstadfjord.

CEPHALOZIA BILOBA Lindb. King Oscar's Land; Havnefjord (Known before only from Stavanger, Norway and from Helsingfors, Finland).

CEPHALOZIA BRYHNII Kaalaas.

Ellesmere Land; Cape Rutherford, lat. 78 deg. 50 min. (Known from Norway and France, previous northern limit lat. 70 deg).

CEPHALOZIA VERRUCOSA (Jens.) Bryhn & Kaalaas sp. nov.

CEPHALOZIA DIVARICATA (Franc.) Dum. v. *verrucosa* C. Jens.

North Lincoln; Framfjord, King Oscar's Land; Havnefjord, Gaasefjord, Reindeer Bay, Excrement Bay, Land's End and Isachsen's Fjord. Northwest Greenland; Foulkefjord. Ellesmere Land; Framshavn, Glacial Valley, Cape Viole, Lastraea Valley, Bedford Pim Island, Cocked Hat Island, Cape Rutherford, Eskimopolis, Beitstadfjord, Skraelling Island.

BLEPHAROSTOMA TRICHOPHYLLUM BREVIRETE Bryhn & Kaalaas var. nov.

Kind Oscar's Land; Excrement Bay. Ellesmere Land; Framshavn, Cape Rutherford, Eskimopolis, Skraelling Island.

DIPLOPHYLLUM GYMNSTOMOPHILUM Kaalaas.

King Oscar's Land; Havnefjord and Isachsen's Fjord, lat. 78 deg. (Known before only from Scandinavia as far north as 66 deg. 30 min.).

DIPLOPHYLLUM INCURVUM Bryhn & Kaalaas sp. nov.

North Lincoln; Framfjord. King Oscar's Land; Havnefjord, Moskusfjord, Gaasefjord, Reindeer Bay. North Kent. Ellesmere Land; Framshavn, Bedford Pim Island, Lastraea Valley, Glacier Valley, Cape Rutherford, Beitstadfjord.

SCAPANIA SIMMONSII Bryhn & Kaalaas sp. nov.

King Oscar's Land; Havnefjord, Gaasefjord.

MUSCI.

GYMNSTOMUM LAEVE Bryhn sp. nov.

King Oscar's Land; Havnefjord, Gaasefjord, Excrement Bay. North Kent, Ellesmere Land; Beitstadfjord and between Fort Juliane and Mt. Koela-Paulsen, lat. 79 deg.

FISSIDENS ARCTICUS Bryhn sp. nov. (Tab. 1, Fig. 2).

King Oscar's Land; Gaasefjord, Landsend and Isachsen's Fjord. North West Greenland; Foulkefjord. Ellesmere Land; Lastraea Valley.

SCHISTIDIUM APOCARPUM OVATUM Bryhn var. nov.

North Lincoln; Framfjord, King Oscar's Land; Havnefjord. Ellesmere Land; Framshavn, Beitstadfjord and between Fort Juliane and Mt. Koela-Paulsen.

SCHISTIDIUM APOCARPUM ABRUPTICOSTATUM Bryhn var. nov.

King Oscar's Land; Havnefjord.

SCHISTIDIUM APOCARPUM SCABRIUS Bryhn var. nov.

King Oscar's Land; Gaasefjord. North Kent.

RHACOMITRIUM BREVISETUM Lindb.

Ellesmere Land; Beitstadfjord at lat. 79 deg. (Before known only from the Island of Sachalin, lat. 52 deg.).

FUNARIA POLARIS Bryhn sp. nov.

King Oscar's Land; Havnefjord, lat. 76 deg. 30 min.

BRYUM AUTUMNALE Limpr.

King Oscar's Land; Havnefjord, Reindeer Bay, Gaasefjord. Ellesmere Land; Glacial Valley, lat. 78 deg. 45 min. (Before known only from Norway).

BRYUM HYPERBOREUM Bryhn & Ryan sp. nov.

King Oscar's Land; Moskusfjord and Gaasefjord, lat. 76 deg. 30 min.

BRYUM LAXIRETE Bryhn & Rynn sp. nov.

King Oscar's Land; Havnefjord and Gaasefjord, lat. 76 deg. 30 min.

BRYUM LILIPUTANUM Bryhn & Ryan sp. nov.

King Oscar's Land; Havnefjord, lat. 76 deg. 30 min.

BRYUM PARVUM Bryhn & Ryan sp. nov.

King Oscar's Land; Havnefjord, lat. 76 deg. 30 min., together with the preceding.

BRYUM BRACHYTHECIUM Bryhn & Ryan sp. nov.

King Oscar's Land; Gaasefjord, lat. 76 deg. 50 min.

BRYUM GEMMACEUM Bryhn & Ryan sp. nov.

Ellesmere Land; Framshavn, lat. 78 deg. 45 min.

BRYUM CORIOIDEUM Bryhn & Ryan sp. nov.

King Oscar's Land; Moskusfjord, lat. 76 deg. 30 min.

BRYUM ANGUSTIDENS Bryhn & Ryan sp. nov.

King Oscar's Land; Gaasefjord, lat. 76 deg. 30 min.

BRYUM SEMIOVATUM Bryhn & Ryan sp. nov.

King Oscar's Land; Moskusfjord, lat. 76 min. 30 min.

BRYUM CANCELLIFORME Bryhn & Ryan sp. nov.

King Oscar's Land; Gaasefjord, lat. 76 min. 30 min.

BRYUM OPDALENSE Limpr.

Ellesmere Land; Glacial Valley, lat. 78 deg. 45 min. (Before known only from Norway).

BRYUM OPDALENSE CARNEUM Bryhn & Ryan var. nov.

King Oscar's Land; Gaasefjord.

BRYUM CURVATUM Arnell & Kaurin.

Ellesmere Land; Glacial Valley, lat. 78 deg. 45 min. (Before known only from Norway).

BRYUM SUBTUMIDUM Limpr.

Ellesmere Land; Framshavn, lat. 78 deg. 45 min. (Before known only from Norway).

BRYUM SALINUM Hagen.

Northwest Greenland; Foulkefjord, lat. 78 deg. 20 min. (Before known only from Scandinavia and Denmark).

BRYUM STENODON Hagen.

King Oscar Land; Gaasefjord, lat. 76 deg. 30 min. (Before known only from Norway).

BRYUM LAPPONICUM Kaurin.

Northwest Greenland; Foulkefjord, lat. 78 deg. 20 min. (Before known only from Scandinavia).

BRYUM SUBFOVEOLATUM Bryhn & Ryan sp. nov.

Ellesmere Land; Framshavn, lat. 78 deg. 45 min.

BRYUM GRAEFIANUM Schlieph.

King Oscar's Land; Gaasefjord, lat. 76 deg. 30 min. (Known from Northern and Central Europe).

BRYUM SIMMONSII Bryhn & Ryan sp. nov.

King Oscar's Land, lat. 76 deg. 30 min.

BRYUM CAMPYLOCARPUM ARCTICA Bryhn & Ryan sp. nov.

King Oscar's Land; Moskusfjord, lat. 76 deg. 30 min. (The species is known only from Norway).

BRYUM OENEUM SUBELIMBATUM Bryhn & Ryan var. nov.

King Oscar's Land; Vendomkap. North Lincoln: Framfjord. Ellesmere Land; Bedford Pim Island and between Fort Juliane and Mt. Koela-Paulsen, lat. 79 deg.

BRYUM AGATTUENSE Philibert.

King Oscar's Land; Gaasefjord, lat. 76 deg. 30 min. (Before known only from Alaska).

BRYUM NODOSUM Bryhn & Ryan sp. nov.

King Oscar's Land; Havnefjord, lat. 76 deg. 30 min.

BRYUM GLOMERATUM Bryhn & Ryan sp. nov.

King Oscar's Land; Gaasefjord, lat. 76 deg. 36 min.

BRYUM NITIDULUM FENESTRATUM Bryhn & Ryan var. nov.

King Oscar's Land; Havnefjord, lat. 76 deg. 30 min.

BRYUM PERTENELLUM Bryhn & Ryan sp. nov.

Ellesmere Land; Eskimopolis, lat. 78 deg. 50 min.

BRYUM DENSUM Bryhn & Ryan sp. nov.

King Oscar's Land; Gaasefjord, lat. 76 deg. 30 min.

BRYUM TERETINERVE Bryhn & Ryan sp. nov.

King Oscar's Land; Gaasefjord, lat. 76 deg. 30 min.

BRYUM CYCLOPHYLLOIDES Bryhn & Ryan sp. nov.

Ellesmere Land; Eskimopolis, lat. 78 deg. 50 min.

BRYUM PAGANUM Bryhn & Ryan sp. nov.

North Devon, lat. 76 deg.

BRYUM VENTRICOSUM SUBTERES Bryhn & Ryan var. nov.

King Oscar's Land; Havnefjord.

BRYUM CRISPULUM DENSIFOLIUM Bryhn & Ryan var. nov.

King Oscar's Land; Gaasefjord; Ellesmere Land; Framshavn.

- BRYUM TOMENTOSUM SUBSPHAERICUM Bryhn Ryan var. nov.
King Oscar's Land; Moskusfjord.
- BRYUM ARCTICUM LATIANNULATUM Bryhn & Ryan var. nov.
Ling Oscar's Land; Havnefjord.
- BRYUM PENDULUM STRIOLATUM Bryhn & Ryan var. nov.
King Oscar's Land; Gaasefjord.
- BRYUM PENDULUM ARCTOBRYOIDES Bryhn & Ryan var. nov.
King Oscar's Land; Moskusfjord.
- BRYUM FRIDTZII Hagen.
King Oscar's Land; Gaasefjord. Ellesmere Land; Glacier Valley, lat. 78 deg. 45 min. (Before known only from Norway).
- BRYUM PENDULIFORME Bryhn & Ryan sp. nov.
King Oscar's Land; Havnefjord, lat. 76 deg. 30 min.
- BRYUM CONFLUENS Joerg.
Ellesmere Land; Glacier Valley and Cape Rutherford. (Before known only from Norway).
- MNIUM SUBGLOBOSUM SUBELIMBATUM Bryhn var. nov.
King Oscar's Land; Gaasefjord. Cardigan Strait; Devil's Island.
- CLINCLIDIUM POLARE (Kindh.) Bryhn sp. nov.
C. arcticum Breggr. and *C. arcticum* subsp. *polare* Kindb.
King Oscar's Land; Havnefjord, Moskusfjord, Gaasefjord, Excrement Bay, Isachsen's Fjord. North Kent. North Lincoln; Framfjord. Ellesmere Land; Framshavn, Lastraea Valley, Bedford Pim Island and Cape Rutherford.
- AULACOMNIUM ACUMINATUM (Arn. & Kindb.) Par.
North Lincoln; Framfjord. King Oscar's Land; Havnefjord, Moskusfjord, Gaasefjord, lat. 76 deg. 30 min. (Before known only from Siberia).
- TIMMIA NORVEGICA EXCURRENS Bryhn var. nov.
King Oscar's Land; Havnefjord and Gaasefjord.
- POLYTRICHUM FRAGILE Bryhn sp. nov. Tab. I, fig. 3.
Northwest Greenland; Foulkefjord, lat. 78 deg. 20 min. Ellesmere Land; Cape Viole, Lastraea Valley, Bedford Pim Island and Cocked Hat Island, lat. 78 deg. 50 min.
- ORTHOTHECIUM ACUMINATUM Bryhn sp. nov. Tab. I, fig. 4.
King Oscar's Land; Gaasefjord, Reindeer Bay. Ellesmere Land; Bedford Pim Island, lat. 78 deg. 45 min.
- HYPNUM POLARE LEPTODICTYON Bryhn var. nov.
King Oscar's Land; Gaasefjord.
- HYPNUM SARMENTOSUM ACUMINATUM Bryhn var. nov.
North Lincoln, Framfjord. Ellesmere Land; Cape Rutherford.
- HYPNUM LATINERVE Arnell.
Ellesmere Land; Framshavn, lat. 78 deg. 45 min. (Before known only from Siberia).
- HYPNUM PSEUDORUFESCENS Warnst.
West Greenland; Egedesminde, lat. 69 deg. (Known from Norway and Bohemia).
- HYPNUM HYPERBOREUM Bryhn sp. nov. Tab. II, fig. 3.
Ellesmere Land; Stahlknechts Island, lat. 78 deg. 40 min.
- HYPNUM REVOLUTUM SUBJULACEUM Bryhn var. nov.
North Devon; Havhestberg. North Lincoln. King Oscar's Land; Havnefjord, Gaasefjord, Sydkapfjord and Vendomkap. Ellesmeer Land; Cape Viole, Lastraea Valley, Cape Rutherford and Skraeling Island.
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